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ABSTRACT

This paper, presented at the National Science Teachers Association (NSTA) conference in April, 1972, in New York City, emphasizes the need for science to become more humanistic and integrated. The author advocates that the middle school, being unique, will require a major restructuring of the present curriculum. Also included are goal statements, now being formulated by the Biological Sciences Curriculum Study (BSCS). Process competencies and specific objectives for each grade level, built on a conceptual hierarchy and intellectual development, are included within this new BSCS program which is to have its first writing conference in the summer of 1972. It is expected that each module will be tested throughout the school year of 1972-73, and a sample module for general use should be available for the fall term of 1973. (CP)

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HUMAN SCIENCES FOR THE
MIDDLE SCHOOL: A BSCS PROJECT

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Human Sciences Project

Human Sciences for the Middle Schools of America begins a venture in curriculum design and organization especially suited to the emerging adolescent. The project is an outgrowth from a series of conferences involving middle school teachers and administrators, as well as representatives from a variety of biological, social and behavioral sciences. Months have also been spent by conferees and BSCS staff members listening to adolescents, the questions they ask and how they view events and themselves. The shifts occurring in our culture have been closely studied, particularly those related to the "quality of life" and what appears to be a search for new values

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in our social structure.

A preliminary step in designing a new curriculum requires learning as much as possible about the students for whom the program is intended. Although there is not as much information on the emerging adolescent as one might expect, we were able to find data on the physical, cognitive, political, moral, and social phases of development. A profile of the emerging adolescent is being organized from research studies to go along with personal observations made by the staff, teachers and writers.

Currently there is a plethora of books being published criticizing the organization and management of schools and the way children are taught. These books have become best sellers because parents have bought them in large numbers. There are commonalities in these books that should be taken seriously in planning a new curriculum, such as the need to recognize young people as individuals, the importance of an education in harmony with the realities of modern life, a demand for a greater range

of learning options in the curriculum, just to mention a few. Our plan is not only to improve the subject matter selection that goes into the curriculum but also to enhance its learnability and use.

The Middle School is in itself a new organizational unit in the American system of education. Typically, it includes grades 6, 7 and 8; however, there are four year middle schools and some two years long, generally called intermediate schools. No combinations of grades known as a "middle school" include grade 9. Currently approximately 2000 schools have the 6, 7, 8 combination of grades. The "middle school" exists to meet the special social, psychological and biological needs of the emerging adolescent. Puberty now comes at an earlier age than it did in the past, which means childhood ends earlier and adolescence arrives sooner. The new school organization provides an arrangement whereby it is possible to work directly with the problems of the pre-adolescent at his own level of development; not as a child nor as an adult. A suitable curriculum, therefore,

would not be like that of the elementary school, nor should it be like that of the high school.

The BSCS recognizes the complexity of the educational challenge it has to meet. We found no science programs we felt were entirely suited to this age range either in terms of goals or subject matter. We are, therefore, starting de novo, creating a science oriented curriculum that does not at present have a counterpart in rationale in schools. The program takes direction from the conflicts and tensions now apparent in the American culture; the biological and social characteristics of the emerging adolescent; the public criticisms of schooling; the changing perspectives about the place of science in society; and the educational philosophy underlying the middle school movement.

To accomplish these broadly conceived purposes will certainly demand a mix of subject matters not now found in the school curriculum. It will also require a major restructuring of the curriculum and new notions about teaching. We know

more now than a few years ago about curriculum designing and it should be possible to invent a new organization. We do not envisage a science course that is completely discipline oriented, nor do we want to treat topics superficially. We want to broadly integrate science into the cultural history, the social and economic conditions of today, and to consider the place of science and technology in the future of man. We do not seek to keep biology "pure" but to examine it in terms of its meaning for man and his welfare, personally and in relation to his fellow beings. Hopefully, we can make it possible for the pre-adolescent to learn about himself: What is he like? Where did he come from? How is he getting along today? What kinds of futures are available to him? And how can he get there with dignity? We also hope we can help him to understand himself as a person and how as a social being he relates to his fellow men and to the biologic and social world. We are as much interested in the emerging adolescent's social, cultural and affective development as we are with his cognitive growth.

Throughout the entire program the student is the object of his own study; he is also the "type animal" for laboratory purposes.

We have given as much consideration to pedagogical considerations as we have to the rationale and substance of the curriculum. We are concerned, for example, with the life uses of education -- this suggests the need to include both inquiry and decision making skills in the program. It also means working in a problem context with problems that involve the individual as well as the community. The student will have opportunities to work both as an individual and in cooperative efforts.

Over the past decade curriculum developments in the sciences have been either confined to a single discipline or a combination of several closely related sciences. We have found the life sciences as disciplines too restrictive for dealing either with the kinds of questions children raise or the problems and issues which beset society. Our solution has been to move to a curriculum organization based upon the human

sciences: anthropology, biology, psychology, sociology, geography, political science and others. Our workshop conferences are always some mix of people from diverse disciplines, in other words, they are multidisciplinary in character.

To find the relevant subject matter for a human sciences program we worked with specialists who sought to identify concepts that lie at the interface between two or more disciplines and to identify where logical "bridges" between disciplines exist. In each instance the concepts selected have meaning in a biological science and connections in a non-biological science. For example, the evolution of man has a dimension in biology as well as in cultural anthropology. If we are to consider the impact of tools on man's cultural evolution and the influence of technology upon economic development, the story cannot be completed within a single discipline. The same is true in studying the cause and control of disease; the problem is not only a biological one but also has economic and social dimensions.

Three integrative themes have been isolated to serve

as guides in designing the human sciences curriculum. These are: continuity and change; conflict, accommodation and cooperation; and equality and inequality. It appears these themes will allow us to present the life sciences in a bio-social context and furnish a means for relating the course in the human sciences to other subjects in the middle school curriculum. Furthermore, these themes not only allow a focus on problems pre-adolescents face today, but provide action directives for long-range problems extending into the future.

Goal statements for the program are now being formulated from the curriculum rationale we have conceived. In curriculum designing, however, goals are in part a product of the effort and are likely to be restrictive if firmed too early. We do expect students, however, to acquire an understanding and appreciation of such concept materials as:

- roles and function of organisms within a community
- interactions and interrelationships of living things
- nature of conflict, aggression, accommodation and

cooperation in social groups

- adaptive behavior as a product of learning and cultural norms
- change within natural and social systems, the continuity of change and man's potential for directing change

In terms of process competencies we want students to understand and appreciate alternative inquiry and explanatory systems in the natural and social sciences such as:

- different ways of inquiring and knowing about man's place in the universe (for example, anthropologists, biologists, psychologists, archeologists, sociologists, geographers, humanists and medical scientists all study man but in different ways, with different perceptions, and with different interpretations, for their observations).
- various coping behaviors for arriving at interpretations and decisions (here we view concepts as having an inquiry role and recognize the need to reduce the fact-value dichotomy in applying knowledge).

These goals serve to integrate the Human Sciences

Curriculum from one grade level to the next. For each grade or maturity sequence, specific objectives are being defined; for example, the goal--"roles and functions of organisms within a community"--is treated in

Phase I -- as the identification and description
of organisms in a community

Phase II -- as a pattern representing a division
of labor

Phase III -- as a comparison of roles and functions
within a community

Two interpretations may be gleaned from this phase sequence:

1) there is a conceptual hierarchy representing a higher degree of intellectual sophistication from one grade level to the next, and 2) the mental operations at each phase correspond with Piaget's research on intellectual development. In Phase I mental operations are at the concrete level; Phase II is transitional, requiring a more systematic behavior than Phase I; and Phase III is at the level of formal-operational thought in

which hypothetical situations are considered and a system of reasoning is required.

At each of these levels the plan is to engage students in a variety of information getting and data using activities. The work will not be limited to the class or laboratory in the usual sense but include the community either directly or simulated. The entire human sciences program is focused upon engaging the student in a wide range of situations requiring him to cope with problems and issues in a variety of "real life" contexts. He will need to make decisions that go beyond empirical data and include moral and ethical judgments, cultural norms, societal values, personal preferences, aesthetic feelings and other means of managing data qualitatively. We want young people to recognize that controversy is a product of differing value systems but that there are rational means for dealing with controversial issues. Problems of life and living are complex and rarely have simplistic answers based upon knowledge derived solely from research.

The curriculum task we have laid out is difficult, but one which we believe can be developed. A framework has been evolved by which we can relate abstract subject matter themes to the specific questions asked by students, preserving on one hand the authenticity of science and social concepts and on the other a respect for the questions children ask.

The first writing conference for the BSCS Human Sciences Curriculum will be held during the summer of this year, 1972. We expect to produce only one module at this time, followed by a "try-out" of the material in middle schools throughout the school year 1972-73. A sample module for general use should be available for the fall term of 1973.